Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-23. (Canceled)

24. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, wherein said enclosure is adapted to isolate said sample liquid from said process liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy; and

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid.

25. (Original) A probe system of claim 24, wherein the housing comprises polypopylene.

26. (Original) A probe system of claim 24, wherein one transducer comprises means for determining the conductivity of the sample liquid and for generating a signal indicative of the conductivity.

27. (Original) A probe system of claim 24, wherein one transducer comprises means for determining the temperature of the sample liquid and for generating a signal indicative of the temperature.

28. (Original) A probe system of claim 24, further comprising a temperature transducer attached to the outside of the housing for determining a temperature of the process liquid and for generating a signal indicative of the temperature.

29. (Original) A probe system of claim 24, further comprising an analysis subsystem for collecting the signals and for evaluating the signals over time.

30. (Original) A probe system of claim 29, wherein the subsystem comprises means for generating control signals which control the generator in response to evaluated signals over time.

31. (Original) A probe system of claim 29, wherein the subsystem comprises a microprocessor.

32. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

(d) ~~A probe system of claim 29, further comprising~~ means for determining total cavitation energy released based upon signals indicative of temperature of the sample liquid over time.

33. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

(d) ~~A probe system of claim 29, further comprising~~ means for calculating total energy released from cavitation through the following relationship: energy (calories) = specific heat x mass of the sample liquid x change in temperature (°C).

34. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

(d) ~~A probe system of claim 29, further comprising~~ means for determining cavitation density based upon signals indicative of conductivity of the sample liquid.

35. (Original) A probe system of claim 34, further comprising means for determining cavitation density as a function of time.

36. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

~~A probe system of claim 29,~~ wherein the subsystem comprises memory for storing at least one of the following parameters: specific heat (p) of the sample liquid, volume (V) of the sample liquid, mass (m) of the sample liquid, and a functional relationship defined as $n=f(C,C_o)$ between conductivity and a number (n) of cavitation implosions.

37. (Original) A probe system of claim 36, further comprising means for calculating cavitation density based upon $n/V=f(C,C_o)/V$.

38. (Original) A probe system of claim 36, further comprising means for calculating energy in each cavitation implosion based upon $(0.00833)(p)(m)(g(t'))/V/ f(C,C_o)/t'$, where t' corresponds to a time of measurement.

39. (Original) A probe system of claim 36, further comprising means for calculating cavitation density based upon cavitation density as a function of time = $f(h(t))/V$.

40. (Original) A probe system of claim 36, further comprising means connected to the generator for controlling the generator based upon calculations of the subsystem.

41. (Original) A probe system of claim 40, further comprising one or more comparators for comparing the calculations to one or more stored parameters.

42. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

~~A probe system of claim 29,~~ wherein the subsystem comprises feedback means for controlling generator frequency in response to the signals.

43. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

~~A probe system of claim 29,~~ wherein the subsystem comprises feedback means for controlling generator power output in response to the signals.

44. (Currently amended) A probe system for sensing process conditions within an ultrasonic process tank of the type that includes process liquid, the liquid being subjected to ultrasound produced by transducers coupled to a generator, comprising:

(a) an enclosure for housing a sample liquid, the enclosure passing ultrasonic energy from the process liquid to the sample liquid, the sample liquid being responsive to the energy;

(b) one or more sensing transducers within the sample liquid, the transducers generating signals indicative of characteristics of the sample liquid;

(c) an analysis subsystem for collecting the signals and for evaluating the signals over time; and

~~A probe system of claim 29,~~ wherein the subsystem comprises feedback means for amplitude modulating signals from the generator to control cavitation density as a function of time within the process liquid.

45-82. (Canceled)

83. (New) A probe system of claim 29, further comprising means for determining total cavitation energy released based upon signals indicative of temperature of the sample liquid over time.

84. (New) A probe system of claim 29, further comprising means for calculating total energy released from cavitation through the following relationship: energy (calories) = specific heat x mass of the sample liquid x change in temperature (°C).

85. (New) A probe system of claim 29, further comprising means for determining cavitation density based upon signals indicative of conductivity of the sample liquid.

86. (New) A probe system of claim 85, further comprising means for determining cavitation density as a function of time.

87. (New) A probe system of claim 29, wherein the subsystem comprises memory for storing at least one of the following parameters: specific heat (p) of the sample liquid, volume (V) of the sample liquid, mass (m) of the sample liquid, and a functional relationship defined as $n=f(C,C_o)$ between conductivity and a number (n) of cavitation implosions.

88. (New) A probe system of claim 87, further comprising means for calculating cavitation density based upon $n/V=f(C,C_o)/V$.

89. (New) A probe system of claim 87, further comprising means for calculating energy in each cavitation implosion based upon $(0.00833)(p)(m)(g(t'))/V/ f(C,C_o)/t'$, where t' corresponds to a time of measurement.

90. (New) A probe system of claim 87, further comprising means for calculating cavitation density based upon cavitation density as a function of time = f(h(t))/V.

91. (New) A probe system of claim 87, further comprising means connected to the generator for controlling the generator based upon calculations of the subsystem.

92. (New) A probe system of claim 91, further comprising one or more comparators for comparing the calculations to one or more stored parameters.

93. (New) A probe system of claim 29, wherein the subsystem comprises feedback means for controlling generator frequency in response to the signals.

94. (New) A probe system of claim 29, wherein the subsystem comprises feedback means for controlling generator power output in response to the signals.

95. (New) A probe system of claim 29, wherein the subsystem comprises feedback means for amplitude modulating signals from the generator to control cavitation density as a function of time within the process liquid.